New Jersey Statewide Transportation Data Model

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NJDOT

Presenter

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Introduction

New Jersey is in the process of implementing new transportation data model.

This presentation will explore:

- Existing data model
- Summary of key concepts of the data model
- Advantages and Impacts

New Jersey DOT

- Currently in the process of updating GIS data to include local roads and ramps
- Converted from Intergraph MGE to ESRI ArcGIS platform
- Opportune time to review database architecture and implement new data model

Existing NJDOT Data Model

- Data relate only to single-centerline
- Includes only “higher order” routes
- No local roads or ramps
- Routes are uniquely identified by a combination of Standard Route Identifier (SRI) and starting milepost

Existing NJDOT Data Model

- Attribute data stored in multiple SQL tables
- Linked to spatial features by SRI

da_lanes **Data Source:** Straight Line Diagram		**Dependant Views:** v4MMS_HMMS_da_roadway v4SLD_Vldr_da_lanes
Index		**Indexed Columns**
IX_da_lanes_descr		descr
IX_da_lanes_sri		sri
IX_da_lanes_sri_mp_start[α]		sri, mp_start
PK_da_lanes[β]		id
Column	**Type(size)**	**Description**
id[χ]	int(4)	Unique Record Identifier
sri	varchar(20)	Standard Route Identifier
mp_start	decimal(6,3)	Beginning Milepost
mp_end	decimal(6,3)	Ending Milepost
descr	int(4)	Number of Lanes
inv_date	datetime	Date of Field Inventory
inv_crew	varchar(4)	Inventory Crew
updt_user_name	varchar(50)	Last User to Update Record
updt_date	datetime	Date/time Record was Updated
created_user_name	varchar(50)	User that Created the Record
created_date	datetime	Date/time Record was Created

Sample of NJDOT Attribute Table

Transportation Data Model

Key Concepts

- A Standard Route Identifier (SRI) will be used to identify routes
- One Routing Layer called Route_Master

New Jersey SRI

17041125_ _

SRI Number

CCMMRRRRSD

CC = county MM = municipality

RRRR = road number S = suffix D = direction

Route Hierarchy

- Routes are categorized based upon jurisdiction
- Naming is keyed to position within the Route Hierarchy
  - Coincident Sections – Route segments will be broken when a route that is higher in the hierarchy runs coincident along the route

Route Hierarchy

Components of the Transportation Data Model

- Geodatasets
- Event Tables
- Topology
- Domains

Geodatasets

- Base Layers – contain background information (orthophotos, water features, etc.)
- Reference Layers – Underlying geometry for other layers
- Routing Layers – contain route feature classes (Route_Master)
- Cartographic Layers – annotation, route shields, etc.

Geodatasets

Routing Layers - Route_Master

- One main route feature class (Route_Master)
- Minimal segmentation
- Parent SRI concept
- Temporal attribution

Line Feature Class
Route_Master

Geometry Polyline
Contains M values Yes
Contains Z values Yes

Field Name	DataType	Allow Nulls	Default	Precision	Scale	Length
ObjectID	OID	No				
Shape	Geometry	No				
SRI	varchar	No				20
Route_type	varchar	No				20
Mp_Start	decimal	No		6	3	5
Mp_End	decimal	No		6	3	5
Street_Name	varchar	Yes				50
Measured_Length	decimal	Yes		6	3	5
Parent_SRI	varchar	No				20
Parent_Mp_Start	decimal	No		6	3	5
Parent_Mp_End	decimal	No		6	3	5
Active	varchar	No				1
Year_Active	varchar	No				4
Year_Retired	varchar	No				4

Event Tables

- Individual tables for each attribute
- All attribute data can be referenced on one road network (Route_Master)
- Contains 2-3 mandatory columns
  - SRI (for point and linear tables)
  - MP_Start (for point and linear tables)
  - MP_End (for linear tables only)

Topology

- Used to manage spatial relationships between geographic features
- Enables sharing of geometry between features and feature classes

Domains

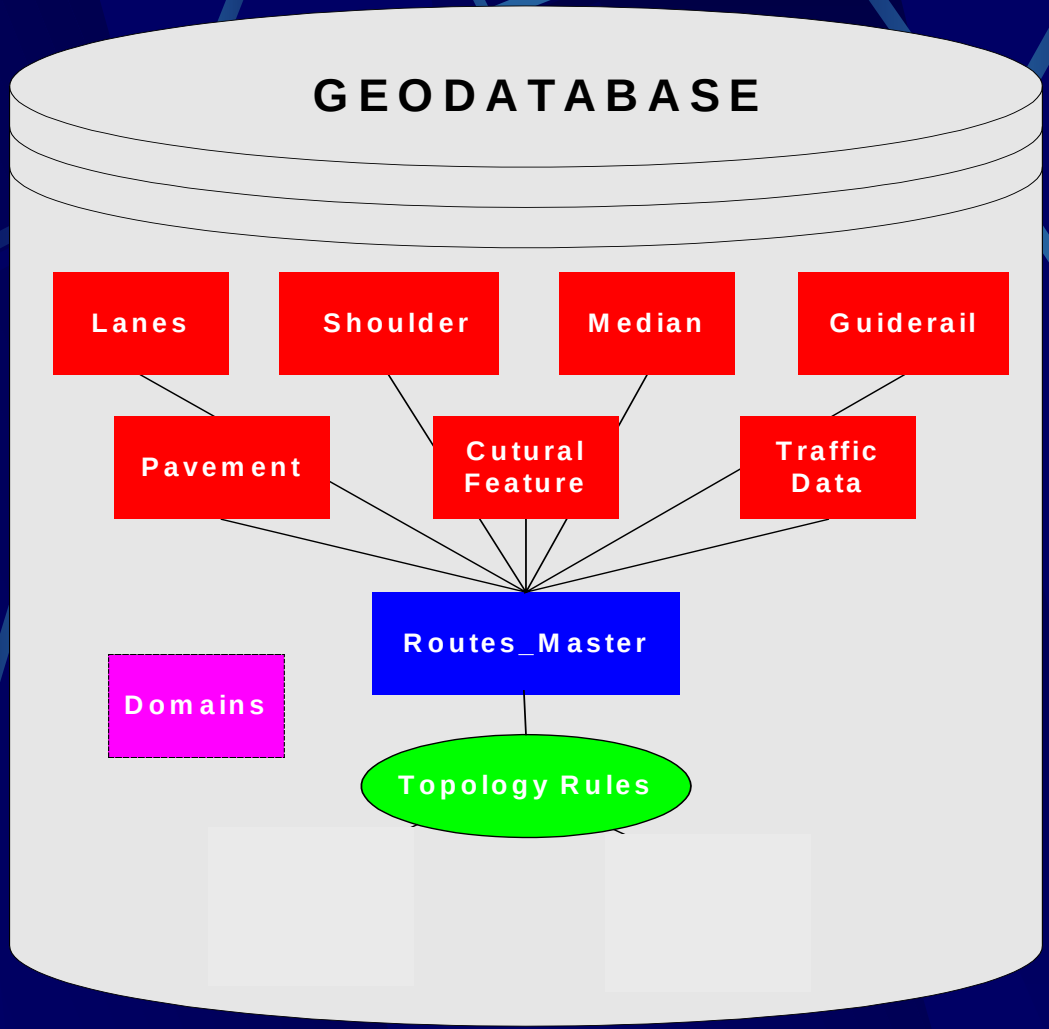
- Tables that contain allowable sets of values for other tables
  - Coded value domains
  - Range domains

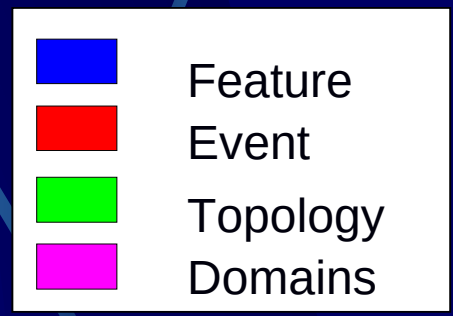
Coded value domain
pave_type
Description: *pavement type list*
Split policy: *Default Value*
Merge policy: *Default Value*

Code	Description
1	Concrete
2	Bituminous
3	Brick or Block
4	Gravel
5	Dirt

Sample Coded Value Domain

The Geodatabase





Centerlines

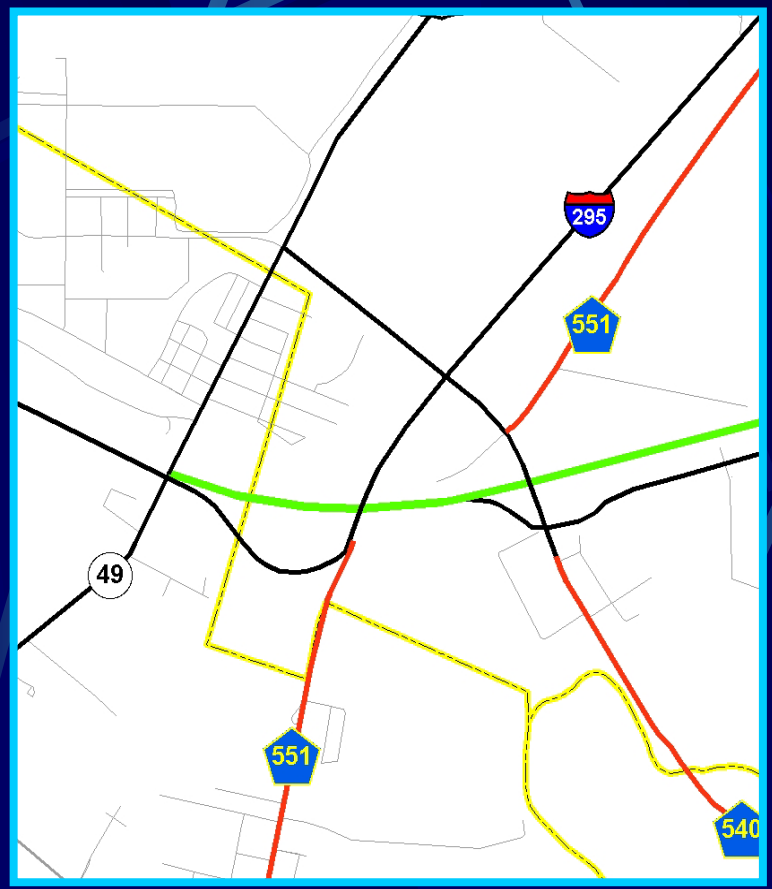
Single Centerline

- Simpler
- Does not always match real-world conditions
- Mileposting can be inaccurate
  - Linear Referencing can be inaccurate

Dual Centerline

- More complex
- More closely matches real-world conditions
- Mileposting is more accurate
  - Linear referencing becomes more accurate

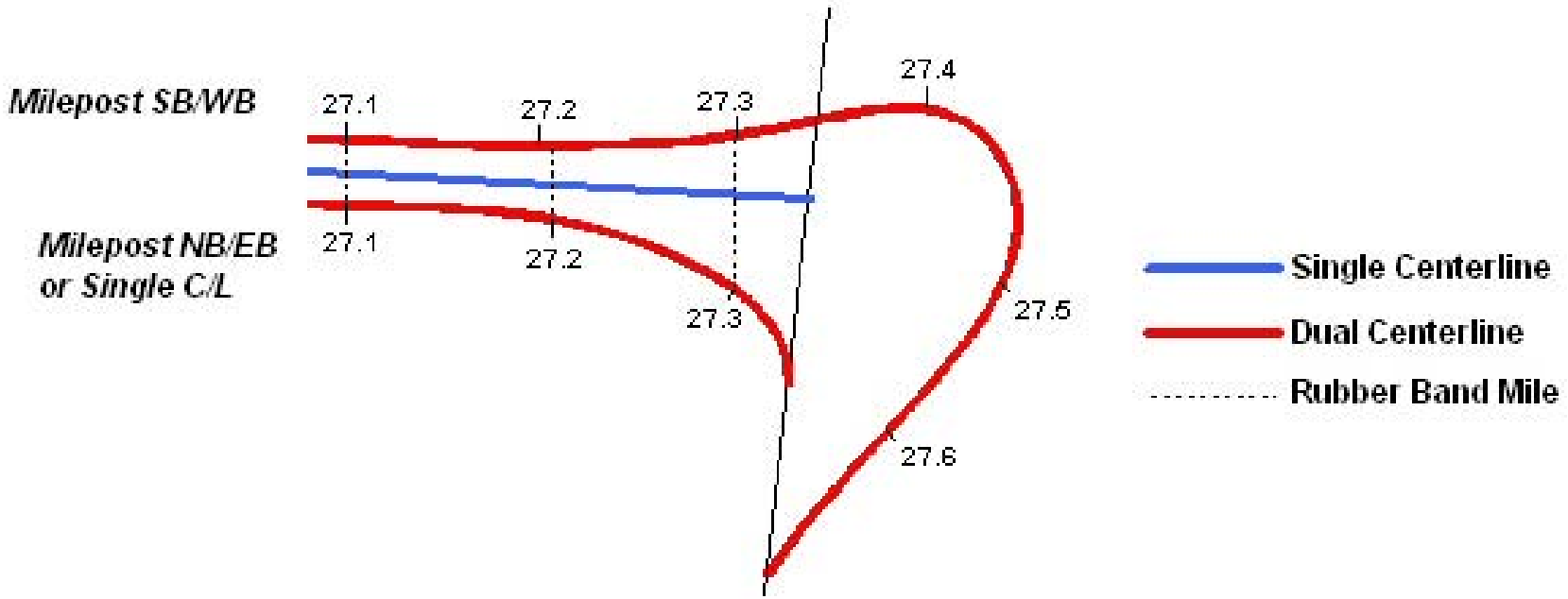
Single Centerline



Dual Centerline

Old vs New

Mileposting Comparison
Single vs. Dual Centerlines

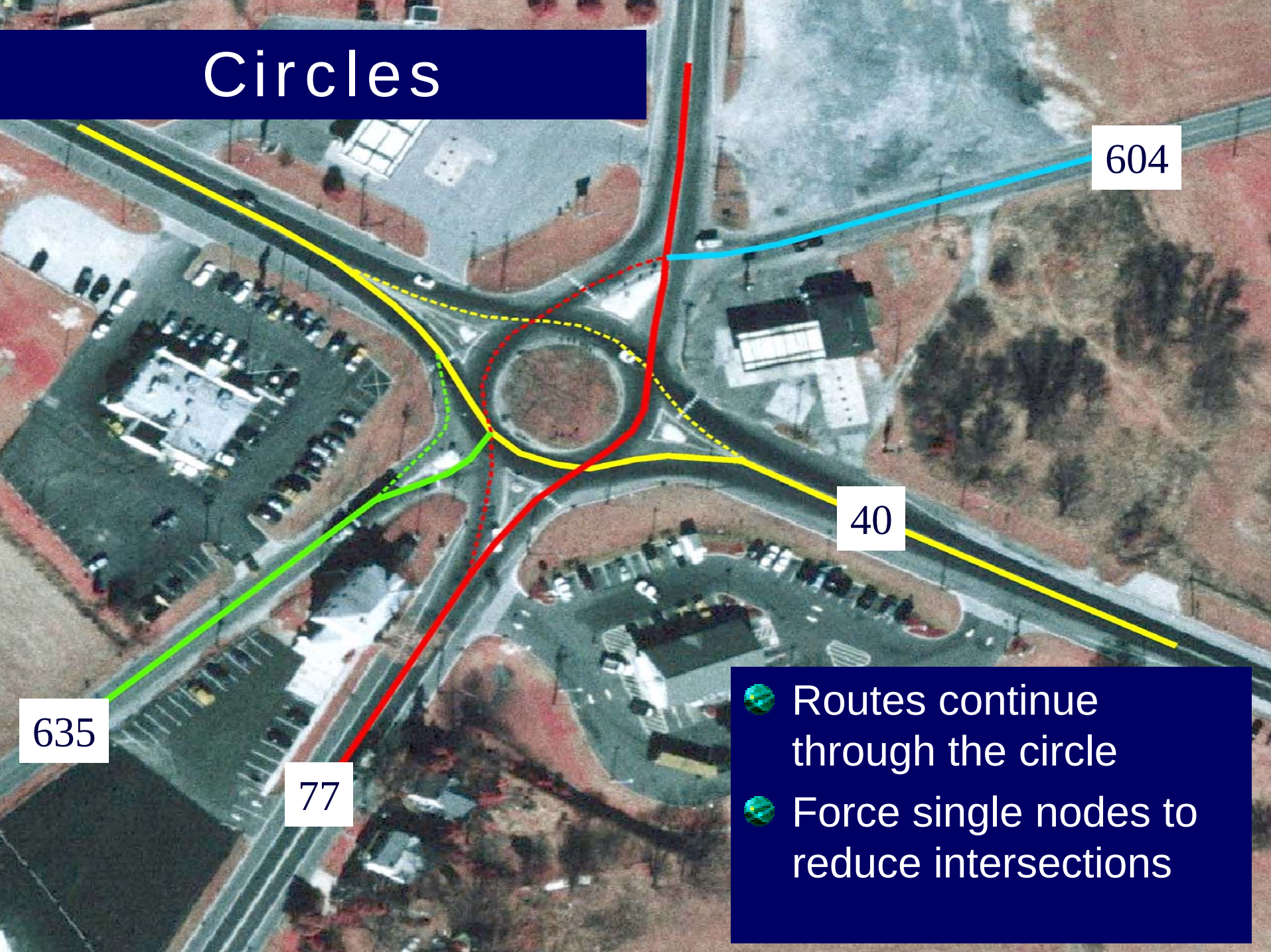


Single vs. Dual Centerlines

Divided Routes

- Dual Centerline Model requires rules for determining when to create a divided route

Circles



- Routes continue through the circle
- Force single nodes to reduce intersections

Data Collection

Digitized
On Screen

Impacts of the New Transportation Data Model

- DOT system databases will need updating
- Learning curve associated with new model

Impacts of NJDOT Data Model

- Data collection needed for ramps and secondary direction centerlines and attributes
- SLD application will need updating

Advantages of the Transportation Data Model

- More intuitive – real world
- Linear referencing more accurate
- Spatial data is more comprehensive:

  now includes local roads and ramps

Conclusions

- Increased accuracy of spatial data
- Increased accuracy of linear referencing
- More user-friendly
- Better decision support

Questions

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